

and are the result of inexperience. The facts are: that nestlings do not thoroughly digest their food (apparently taking only the most available nourishment), so that identification is easier in corresponding cases than in adults; and that not only stomach analysis, but even examination of excrement, gives results that far surpass in definiteness and accuracy, anything that can usually be learned by field observation.

For instance contrast the following statements of the results (from the paper reviewed) of 16 hours watching the feeding of brown thrasher nestlings and the analysis of a few droppings of nestling cardinals.

<i>Brown Thrasher</i>	<i>Cardinal</i>
150 cutworms	17 rose-beetles (<i>Macrodactylus subspinosus</i>)
9 "worms"	2 other Scarabæidæ
5 earthworms	1 click beetle (<i>Limonius</i> sp.)
11 dragonflies	1 caterpillar hunter (<i>Calosoma scrutator</i>)
10 beetles	1 leaf-hopper (Jassidæ)
50 ants	3 grasshoppers
1 grasshopper	1 spider
72 or more other insects.	1 dragonfly
	many bits of snail
	17 blackberry seeds (<i>Rubus</i> sp.)
	221 mulberry seeds (<i>Morus rubra</i>)

Is it not obvious that the examination of excrement if carried on to an equal extent would surpass field observations in every way? Stomach examination would be still more definite as to composition of food; but would not yield so much information on quantity. The greatest defect of this method however, is that only one batch of data is obtained from a single individual.

The foregoing notes on the cardinal are quoted from the reviewers' paper on the grosbeaks,¹ where the method of studying the food of nestlings by analysis of the excrement was urged. The method used was to tie a bag with a distinctly colored tape, over the breastbone and under wings of each nestling. The excrement can be gathered from such bags at any intervals desired and preserved as separate castings or in mass for analysis. The observer need not remain at the nest but can carry on similar operations at several nests if desired. This work could be carried on by the same class of observers who now publish data on the frequency of feeding and the material if analyzed by competent scientists, would yield a vast amount of definite and therefore valuable information.—W. L. M.

Effect of Poisoning Operations on Birds; Value of Carrion Feeders.—These interesting topics are further illuminated by data presented by W. W. and J. L. Froggatt in their third report on sheep-

¹ Bull. 32, U. S. Biol. Survey, 1908, pp. 23-24.

maggot flies in Australia.¹ As one of the measures directed toward the control of flies, carcasses are sprayed with arsenic water. Large numbers of flies are thus killed but there is no evidence that birds are destroyed by feeding upon the poisoned flies. The authors cite corroborative experience in South Africa where storks fed freely upon poisoned locusts without ill effects.²

Messrs. Froggatt note that many people consider that rabbit poisoning operations are responsible for a decrease in the number of birds and therefore for the pest of blowflies. The principal bait used for rabbits appears to be poisoned bran and as the work is done upon a large scale the bait is hauled about in carts. The authors express the opinion however that "the use of the poison-cart has been a very minor factor in the decrease of insectivorous birds, for with the exception of one or two, these birds do not follow the poison-cart to pick up the bits of poisoned bran or devour the dead rabbits." (p. 22). Where birds have been reduced it has been due chiefly to clearing of the land, to lack of water and to depredations of feral cats.

The testimony of these Australian authors is interesting to us in the United States, as there are complaints that the use of poisoned bran as bait for cutworms has caused destruction of birds. The United States Bureau of Entomology which recommends this method has looked carefully into the question of possible effect upon birds and has decided that no harm is done. Nothing in the experience of the United States Biological Survey has inclined it to doubt this conclusion.

When poisoned grain is used the effect is sometimes disastrous however, as Mr. S. E. Piper stated in his report on the mouse plague in Nevada.³ He remarks: "Unfortunately a large number of magpies and blackbirds fell victims to the poisoned grain; while to a less extent meadowlarks, killdeers, and mourning doves were killed."

The other point brought up by Messrs. Froggatt, the possible poisoning of predatory and carrion feeding birds by their eating animals killed by poisons has been carefully investigated by field men of the Biological Survey and their unanimous conclusion is that such destruction is negligible.

Destruction of birds by direct feeding upon baits placed for predatory animals however, is another question and one that should be kept in mind at all times in the great campaign of this kind now being waged in our western states. In Australia "the destruction of the carrion-feeding birds

¹ Farmers' Bull. 113, Dept. of Agric., New South Wales, June, 1917, p. 9 and pp. 21-24. Bull. No. 95 on the same subject was noticed in 'The Auk,' 33, No. 2, April, 1916, p. 217.

² In this connection see Mr. E. H. Forbush's summary (Ninth Ann. Rep. State Ornithologist, 1916, p. 24) of the examination of birds thought to have been killed by spraying operations in Massachusetts, "Thus far the evidence is chiefly negative, as in nine years only three birds that possibly were poisoned by spraying have been found." Another valuable publication to consult is 'Arsenical Residues after Spraying,' by W. C. O'Keane, C. H. Hadley, Jr., and W. A. Osgood, Bull. 183, N. H. Agric. Exp. Sta., June, 1917.

³ Yearbook, U. S. Dept. of Agric., 1908 (1909), p. 308.

commenced and was nearly completed. . . . by the use of strychnine baits laid for dingoes, wild dogs, wedge-tailed eagles, and crows, for it attracted and killed out most of our numerous useful small eagles and hawks" (p. 22).

The authors go on to say: "The carrion and carnivorous birds were so numerous less than forty years ago that very little carrion about the home station or sheep paddocks remained long enough to decay or to feed maggots. The inhabitants of the Southern United States and Mexico are wiser with their scavenger birds. They protect the turkey buzzard or vulture which is semi-domesticated in their towns, and so numerous that even a dead horse or bullock is stripped to the bone before it has been dead twenty-four hours" (p. 22). Whatever the merits of this encomium it now comes rather as coals of fire for the Southern States mostly have reversed their policy respecting the buzzard chiefly on account of a conjectural relation of the bird to the spread of stock diseases.¹

Messrs. Froggatt are of the opinion that "the carrion-destroying birds had a very great deal to do with the reduction of the numbers of insects like blow-flies. . . . far more than the true insectivorous birds." However, some of the latter are commended for feeding upon the sheep-maggot flies, among them the Noisy Minah (*Myzantha garrula*), the White-eared Honey-eater (*Ptilotis penicillata*) and the Willy Wagtail (*Rhipidura tricolor*). Two of these are additional to the four groups mentioned in the previous report. A further warning is sounded regarding the starling.—W. L. M.

Economic Ornithology in recent Entomological Publications.—

In a report on white grubs which injure sugar cane in Porto Rico,² Mr. E. G. Smyth gives considerable credit to bird enemies of these pests. He refers to the results of stomach examination cited in Wetmore's 'Birds of Porto Rico'³ and gives an account of some of his own field observation.

"The blackbird or "mosambique," Mr. Smyth says, "is placed as the most important bird enemy of white-grubs because of its great abundance in those parts of the Island where the white-grubs are most injurious, namely, in the arid coast districts. It is a very common sight to observe considerable flocks of these birds following the plows and picking up grubs when fields cleared of cane are being broken up. . . . At Santa Rita, near Guanica Centrale, during the winter plowing season, actual observation and count, it was shown that over 90 per cent of the grubs exposed to light by the plows are picked up by these birds, so that the employment of peons to follow the plows and pick grubs is quite unnecessary in that district. When it is considered that a bird is able to consume more than the equivalent of its own weight of food in twenty-four hours, and that blackbirds during the plowing season of five to six months subsist almost wholly

¹ See 'The Auk', 30, No. 2, April, 1913, pp. 295-8.

² Journ. Dept. Agr. Porto Rico, 1, No. 2, April, 1917, pp. 53-54.

³ Bull. 326, U. S. Dept. Agr. 1916, reissued as Bull. 15, Insular Exp. Sta., P. R. 1916.